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## NEW YORK WATER SUPPLY.

*The Catskill Water Supply of New York City: History, Location, Sub-surface Investigations, and Construction.* By Lazarus White. Pp. xxxii+755. (New York: John Wiley and Sons; London: Chapman and Hall, Ltd., 1913.) Price 25*s*. 6*d*. net.

TECHNICAL records of important engineering undertakings, so far as their accessibility to the public is concerned, are apt to be scattered and fragmentary. A paper will usually be read before one or other of the leading professional societies, giving in condensed form so much of the history of the work as is deemed suitable for publication. In addition, articles will have appeared from time to time in the technical and daily Press, authoritative in varying degree, giving descriptions in general terms of the progress made. But these, while admirable in themselves, scarcely exhaust the desire for information on the part of the general body of the profession, who would often wish to be furnished with certain specific details omitted from the condensed official accounts. A marked reticence, for instance, is observed, as a rule, on the subject of cost. There seems to be a fear lest the disclosure of more than a few figures of comprehensive significance should give rise to criticism of an adverse and inconvenient nature. And such details, accordingly, are almost invariably withheld, or, at best, are obtainable with difficulty.

These remarks are prompted by the consideration that the volume before us is quite exceptional in its scope and treatment to the experience described above. It is a commendably full, clear, and complete account of an undertaking of considerable magnitude, in which a great wealth of information germane to the subject is set out in much detail.

The author, a division engineer engaged on the work, has been fortunate in a chief who encouraged him in his task of compilation, and "gave him a helping hand throughout." He was also favoured with the cooperation of his colleagues. The long list of names mentioned in the preface demonstrates a very generous and loyal effort on the part of all concerned to produce a trustworthy and comprehensive account of the experience gained, the difficulties encountered and overcome, and the carrying through to a successful conclusion of a notable engineering feat.

The water supply of New York City has long been the subject of contention and conflicting opinion. It has been derived from many and varied sources. In the early days of Dutch colonisation it was mainly drawn from public and private wells. One well in particular, we are told, known as the Tea Water Pump, was so frequented that its neighbourhood became congested with water carts, and the spout of the pump had to be raised and lengthened to permit pedestrians to pass under it. Wells, however, are not a very trustworthy source of supply, and with the growth of the town they became tainted and inadequate. Spurred on by the ravages of epidemics which visited them, the inhabitants initiated a variety of schemes for obtaining a better and purer service; but it was not until 1830 that the first public waterworks were inaugurated. These consisted of a shaft, 16 ft. in diameter, sunk 112 ft. deep into the solid rock at a point situated at the junction of 13th Street and Broadway, with two horizontal galleries near the bottom of the shaft. The daily yield obtained by pumping was 21,000 gallons—an utterly inadequate provision for the needs of a rapidly-developing town.

The first really effective undertaking was the old Croton overflow weir or dam and aqueduct, constructed between 1837 and 1842, the former being located about six miles above the mouth of the Croton River. The capacity of the aqueduct was estimated at from 72 to 95 million gallons a day, and the population at this time was about 300,000. As time went on, it became necessary to increase the number and capacity of the storage reservoirs, and in spite of efforts made in that direction, the city experienced serious shortages of water in the years 1869, 1876, 1880, and 1881. By this last-named date, the population had increased to a million and a quarter, while the supply, augmented by a connection with the Bronx River, did not come to more than 102 million gallons a day. It was estimated that the demand was for 45 million gallons in excess of this. And here it may be remarked, in passing, that the daily consumption of water per head is curiously very much higher in the United States than it is in this country. For six of the largest cities in the United Kingdom, the quantity averages 35 gallons per head, as compared with more than 100 gallons in New York, 139 gallons in Chicago, and 187 gallons in Philadelphia.

The new Croton aqueduct from Croton Lake was built between 1885 and 1890, and the daily consumption of the population of 1,720,000 in 1890 immediately mounted to 170 million gallons —about one-half of the maximum capacity of the supply. The new Croton dam, commenced in 1892, was completed as recently as 1907.

As, owing to the growth of the city, the capacity of the Croton watershed showed signs of becom-

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ing exhausted at an early date, a commission was appointed, in 1903, to report on the whole question of future policy, and after due inquiry they recommended the impounding of the Catskill watershed, including the Esopus, Rondout, Schoharie, and Catskill creeks. Following this report, in 1905, the Board of Water Supply was organised, and the necessary sanction having been obtained, the field was open for operations to be commenced.

The basins from which the new supply is taken lie due north of New York, within a range of about one hundred miles from the centre of the city. It is calculated that the available yield of the total area is about 660 million gallons daily, but from this, for the present, at any rate, must be deducted the Schoharie watershed (136 million gallons), for which powers of incorporation have not been granted.

At this point we must leave the reader who wishes to pursue his researches further to do so in the volume itself. It will be found replete with data and particulars relating to the various contracts entered into for the execution of the project which has just recently been completed, and the author must be complimented on the result of his painstaking efforts to produce an account worthy of the achievement, which, with its 120 miles of dams, aqueducts, and tunnels, he proudly describes as "hardly second to the Panama Canal."

B. C.

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## ROMANCE IN ARCHÆOLOGY.

*Egyptian Art.* Studies by Sir Gaston Maspero. Translated by Elizabeth Lee. Pp. 223+plates. (London and Leipzig: T. Fisher Unwin, 1913.) Price 21*s.* net.

"AT two o'clock in the afternoon of February 12, 1906, while Naville was finishing his lunch, a workman came running up to tell him that the top of a vault was beginning to emerge from the earth." This is the opening sentence of the eleventh section or chapter in Sir Gaston Maspero's latest work, and it may serve as an indication of the book's quality. We here have no carefully reasoned presentation of the various aspects and problems presented by Egyptian Art. Such a work, by the same author, we already possess in "Art in Egypt," which has appeared within the year in the *Ars una: species mille* Series. "Egyptian Art" falls into quite a different category, and will prove an admirable foil or supplement to the more formal treatise.

It consists, in fact, as a sub-title warns us, of a collection of "Studies," written during a period of more than thirty years, which have been rescued from the pages of old periodicals, and are here presented together in an attractive English dress. Each is a separate essay, complete in itself; in some a single piece of Egyptian sculpture is described; others deal with an allied group of pieces, or of goldsmiths' work. But one characteristic is common to them all: the subject is used as a peg on which the author displays some idea or principle, generally of wider application than the particular example he selects. So any reader who already possesses "Art in Egypt" will here find Sir Gaston's views applied in a number of specific instances. The relation of the two books is very much that of a treatise on algebra to a series of worked-out problems.

The papers are here translated direct from the journals in which they made their first appearance, and have been subjected to no subsequent re-writing. Consequently, describing, as several of them do, masterpieces of Egyptian art within a day or two of their discovery, they still reflect the author's first enthusiasm, unblunted by later familiarity. The reader is transported from the atmosphere of a museum to the clear air of the Egyptian desert. He watches the diggers at their work, and shares something of their excitement. If he continues the chapter from which we quoted the opening words, he will soon see the head of the wonderful Hathor Cow standing out from the black recesses of the rock-hewn vault at Deir-el-Bahari as the *débris* of centuries is removed. Or turning to chapter xvii. he may, if he will, stand with Sir Gaston's *ghafirs* as they watch the workmen who are making a railway embankment on the site of ancient Bubastis. It has been reported that jewelry has been found; the police have searched the workmen's houses, and have recovered some of the pieces, but the fellahs have kept their secret. Suddenly a workman with his pick lays bare several fragments of silver. He tries to conceal them, but the *ghafirs* are too quick for him; and soon the Treasure of Zagazig, exquisite jewelry and vases of the XIXth Dynasty, is uncovered in the sunlight, a heap of gold between two layers of silver.

We have purposely laid stress on the vivid character of Sir Gaston's pages, for they serve to restore the element of romance which of late years archæology has run some risk of losing, at least for the general reader. But in doing so, we have left no space to touch on the general principles which the essays are intended to drive home, such as the utilitarian character of Egyptian art and the influence of a fixed purpose on its forms and conventions. Nor can we follow the

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